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ABSTRACT

This monograph reviews the research findings related to study skills and provides a limited number of examples. The monograph emphasizes the relationship of information processing theory to effective teaching and learning, and details the growth of interest in metacognition. It reviews existing programs that teach study skills and discusses the integration of techniques into content areas. It also explores the impact of developmental changes on memory and techniques used to enhance metagcognitive development, and it discusses the incorporation of study skills into learning outcomes. An 80-item bibliography concludes the volume. (JD)

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What Research Says to the Teacher

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Study Skills

by Mary Ann Rafoth
Leonard DeFabo

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by Mary Ann Rafoth
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The Authors

Mary Ann Rafoth is Assistant Professor, Department of Educational Psychology, Indiana University of Pennsylvania, Indiana, Pennsylvania.

Leonard DeFabo is Professor, Department of Educational Psychology, Indiana University of Pennsylvania, Indiana, Pennsylvania.

The Advisory Panel

Elizabeth L. DaGue, Freelance Writer and Retired English Teacher, Alton High School, Illinois

Thomas W. Hine, Intermediate Level Teacher, Wolcott School, West Hartford, Connecticut

Daniel Paul, Professor of Educational Methods, Hope College, Holland, Michigan

INTRODUCTION

Students are frequently presented with tasks that demand independent study and memory skills in school. When teachers announce to the class, "Don't forget to study for the test tomorrow," they are probably assuming that students know how to study for the test. The need to suggest and explain specific study routines to students is often not obvious. Even when teachers do suggest specific strategies, they often neglect to explain why students should follow their suggestions. While teachers do instruct students in the use of memory and study strategies, they do not do so with high frequency (61).* It is important that teachers not only train students to be proficient in specific subject matter or problem-solving techniques, but also that they work to increase students' awareness of their own memory, comprehension, and learning. This aspect of learning—metacognitive awareness—allows the learner to know how and when to apply appropriate learning strategies. This skill enables students not only to learn more effectively under teacher direction, but to become independent learners as well. Most importantly, acquisition of these skills also fosters lifelong learning.

The results of training studies indicate that classroom teachers can do much to aid students in developing effective memory and study skills (9, 51, 67) if they provide students with explicit instructions, demonstrations, and feedback about strategies.

This monograph reviews the research findings related to study skills. It provides a limited number of examples because of space constraints. For additional explanation, the reader is referred to the bibliography. The monograph emphasizes the relationship of information processing theory to effective teaching and learning and details the growth of interest in metacognition. It also reviews existing programs that teach study skills and discusses the integration of techniques into content areas. In addition, it explores the impact of developmental changes on memory and techniques that enhance metacognitive development. Finally, it discusses the incorporation of study skills into learning outcomes.

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*Numbers in parentheses appearing in the text refer to the Bibliography beginning on page 28.

DEFINITION AND HISTORICAL OVERVIEW

Study skills are those abilities that enable students to systematically organize, plan, and encode information they need to learn. Some of these abilities are rooted in the reading process (41). A set of study skills used to solve a problem such as taking a test or remembering a long list of items is a specific learning strategy. While rarely overtly attended to by teachers, instruction in study skills is essential for learning. According to Gagné and Driscoll, "a high priority goal often cited for education is to teach students to be self-learners and independent thinkers," (37, p. 133). Learners must be taught to use and monitor self-generated strategies to support the internal processes of learning; in effect, the development of a repertoire of study skills enables students to act as teachers and to facilitate their own learning much as a teacher would.

Study skills instruction has traditionally involved teaching students to follow a plan of action, especially when reading, that would enhance meaningful encoding of the information and aid in self-monitoring. More recently, the focus of attention has broadened to include the learner's own awareness of thinking processes and how to employ these processes to achieve a learning goal (37). Thus, metacognition is crucial to the student's ability to learn independently (67). Effective instruction in study skills should focus on what the learner can do at each step of the learning process to enhance memory and comprehension.

INFORMATION PROCESSING THEORY AND EFFECTIVE TEACHING AND LEARNING

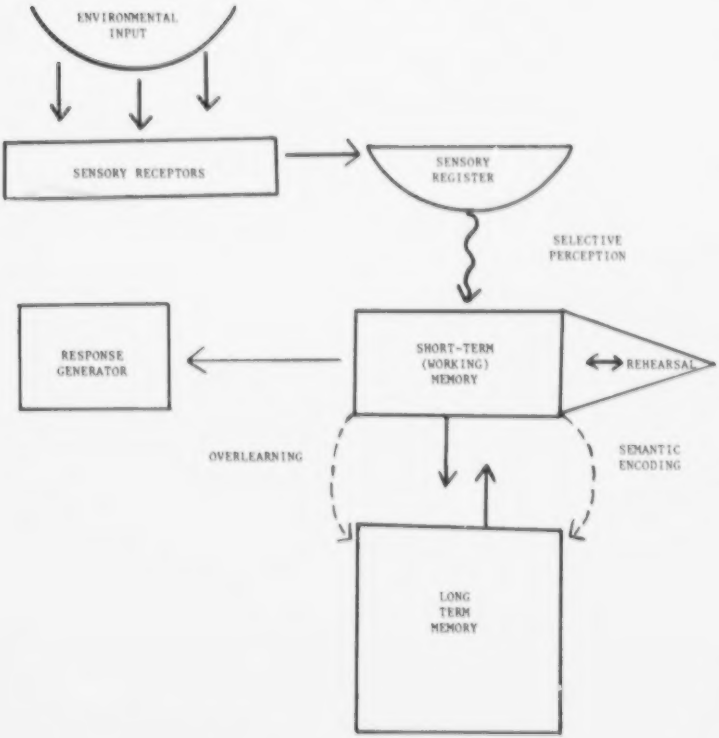
The Information Processing Model

An information processing approach to study skills instruction encourages students to act as a teacher would to facilitate learning at each step of the process. The information processing model describes the flow of information through the brain and the mental processes that accompany it (see Figure 1). As information (visual, auditory, tactile, kinesthetic, or olfactory stimuli) enters the receptive organs, it is registered briefly in the sensory register. Immediately some information enters short-term memory through a process called selective perception.

Selective perception allows only specific information to enter into our conscious awareness. It is controlled by the focus of our attention and the set of expectancies we have prior to receiving the information. These abilities (to direct and focus attention and to set our own expectancies) are examples of the executive control processes of the brain. The ability to control these processes effectively is an important element in independent learning. In the classroom, teachers facilitate selective perception for their students by helping them to focus and direct their attention to main ideas and important details, and to make discriminations. Additionally, teachers create expectancies for students via anticipatory sets, advance organizers, premature presentation of abstract material, listing objectives, and overviews.

Once information enters short-term memory it remains there for about 20 seconds unless actively rehearsed. If enough repeated rehearsal or practice occurs, the information may be forced into long-term memory through a process called "overlearning." Most students learn important but essentially nonmeaningful information, such as the alphabet or multiplication tables, in this way. Many psychomotor skills (riding a bike, swimming, handwriting) are also similarly learned through repeated practice. Once information is overlearned it remains more or less permanently available. Thus, the old adage, "It's like riding a bike; you never forget it," is true.

Figure 1. THE LEARNING PROCESS



However, many of us also used other methods to learn the alphabet or the multiplication tables. These involved increasing the meaningfulness of the material through a variety of techniques. These techniques are representative of the second way in which information is transferred from short-term into long-term memory—meaningfulness. When information is inherently meaningful or important to use, it is automatically remembered. The brain encodes meaningful information with related concepts and material already known and understood. Thus, we remember new information that is meaningful much more easily and we understand and store it in relation to other, previously encoded knowledge.

Teachers enable their students to remember information by providing opportunities for repetition of learning and rehearsal and practice (enhancing chances for overlearning). Effective teachers, however, capitalize on the advantages of meaningful encoding for retention; they strive to make material meaningful and relevant to their students, promoting automatic and relatively effortless encoding and understanding. Effective teachers may also utilize these "meaningfulness effects" by organizing information into chunks and units and cueing their students about important relationships. In addition, teachers may recommend specific mnemonic techniques to help their students add meaning to rote information.

These techniques may be very simple (setting the information to music as in the familiar "ABC" song) or more complex (involving systems for memorizing specific kinds of information—e.g., first-letter mnemonics to remember lists, the loci method for remembering the points in a speech, the key word method for learning foreign language vocabulary). Students often retain these specific helping techniques and use them to retrieve the information in the future. They may not, however, generalize these techniques or generate them spontaneously on their own.

The way in which information is encoded determines how it will be stored and which cues will activate retrieval (encoding specificity theory) (75). The closer the manner of encoding parallels the demands of performance, the more effective it will be in aiding retention and retrieval. Thus, teachers often give cues to their students while teaching new material that will enhance students' retention of a particular performance task.

Successful students differ from unsuccessful students in the degree to which they are able to attach meaning to new information, select

appropriate strategies to aid in retention, and match the way in which information is encoded to the performance demands of the criterion task. Again, students with effective study skills act as independent learners by acting as a teacher to themselves. Thus, effective study skills mean that the learner is in control of his or her learning—as well as aware of lack of understanding, poor comprehension, and poor retention.

Successful students monitor their comprehension of both written and oral information and take action when they find they are confused (5). Similarly, successful students monitor their own memory processes and are aware of when they have memorized information and can make accurate judgments about the quantity and quality of information they can recall. In the classroom, teachers check students' comprehension and memory through questions, activities, and evaluations. When students develop the ability to do this for themselves (self-testing mechanisms allow for this more easily), they have a routine of effective study and allow themselves to be independent learners.

Metacognition

One's awareness and understanding of learning and memory has become increasingly linked to effective study skills. In 1979, Flavell noted that the nature and development of *metacognition* was an important area for investigation. He defined metacognition as one's knowledge of cognition and cognitive monitoring. Metacognitive knowledge consists of three factors: person, task, and strategy (33). The first variable, person, implies knowledge of interindividual differences (I can remember lists quicker than you), intraindividual differences (I remember information I see better than information I hear), and universals of cognition (you need to attend closely to remember important details).

The second variable, task, includes such elements as performance demands (i.e., whether one is required to remember the gist of a story or its exact wording). The third variable, strategy, includes knowledge about the effectiveness of certain strategies for specific tasks and for each individual. Interest in assisting the development of these types of metacognitive knowledge in students has been growing for the last 20 years.

Specifically, much interest has centered on metacognitive strategy instruction. The purpose of such instruction is to influence how the learner interacts with the learning situation (65). Not only has research concentrated on effective teaching of specific cognitive strategies, but some investigations have attempted to increase the level of metacognitive awareness in students.

Reciprocal Teaching, developed by Palinscar and Brown (66), is a method developed specifically to aid reading comprehension by increasing metacognitive awareness in students. Learners improve their ability to monitor comprehension while reading by initially participating in a dialogue with the teacher to jointly construct the meaning of the text. Four strategies are used to aid this dialogue: summarizing, question generating, clarifying, and predicting. Gradually responsibility for initiating the dialogue shifts from the teacher to the students who are encouraged to "act like a teacher would" and "think of some questions a teacher might ask."

Reciprocal Teaching is representative of some of the most successful and innovative techniques in effective study skills acquisition in that it (1) incorporates training in metacognitive awareness in students; (2) is embedded in the teaching of specific content; (3) teaches specific cognitive strategies that are highly generalizable while providing practice for students; and (4) transfers responsibility for learning to students, encouraging independent learning.

TEACHING STUDY SKILLS

Detached and Embedded Programs

Study skills can be taught in two ways—as a set of learner strategies taught outside the regular curriculum—*a detached strategies training approach*—or as strategies embedded within the regular curriculum—*embedded strategies training* (37). Detached training programs have been the more traditional approach in schools. These programs were most often introduced at the higher grades and geared toward students who were unsuccessful. Students are typically taught sets of specific strategies for specific tasks and how to select and use them to maximize learning. Some examples of detached strategy instruction programs are those developed by Weinstein (77) and McCombs (55). The most successful of these programs teach students about cognition and how to regulate their own learning (56). Many publishers offer commercial materials for teaching study skills. Most of these packages are developed for the middle school grades and higher; recently, however, programs geared to the elementary level have also been developed. They may concentrate on a specific set of skills, such as note-taking, outlining, or test-taking. Table 1 contains a listing of such materials used in kindergarten through grade 12.

Teaching study skills through a detached approach, however, has many inherent problems. The foremost of these is the failure to provide students with opportunities to practice skills with relevant material in varied settings. Since detached programs tend to treat content as tangential to study skills, students are unable to make applications to specific content and little transference or generalization occurs. Detached strategy training may be effective if students participate in the programs for long periods (one to two years) and if the strategies are taught with content matter of importance and interest to students (69).

Detached training programs may also be helpful when used to introduce embedded approaches. In this case, the detached program serves as an advance organizer for students. An advance organizer is an introductory statement or explanation of a high-level concept or relationship that is broad enough to encompass subsuming information. According to Ausubel (6), advance organizers act as scaffolding (ideational frameworks) for more specific and meaningful informa-

Table 1.
COMMERCIAL MATERIALS FOR TEACHING STUDY SKILLS

Material	Publisher	Description
Developing Effective Study Skills	United Learning 6633 W. Howard St. Niles, IL	Includes six filmstrips and workbooks that teach notetaking, writing reports, following directions, and remembering. Grades 4–8.
High School Study Skills	United Learning 6633 W. Howard St. Niles, IL	Multimedia kit including eight units: homework, reading strategies for content areas, notetaking, test taking, and reports.
HM Study Skills Program	NASSP 1904 Association Dr. Reston, VA	Provides 12 activity-oriented units, each of which helps teachers integrate study skills instruction with existing curriculum. Grades 5–10.
Into Studying	Scholastic 904 Sylvan Englewood Cliffs, NJ	Workbook with emphasis on reading and writing skills. Grades 7–9.
Learning How to Learn	Developmental Learning P.O. Box 4000 Allen, TX	Consists of five resource manuals that focus on skills in studying, reading, writing, listening, teaching. Grades 7–12.
Let's Learn to Study	Guidance Associates 1526 Gilpin Wilmington, DE	Two-part filmstrip program designed to introduce students to the benefits of learning and applying study skills. Grades 7–12.
Listening and Note taking Skills	Educational Activities P.O. Box 392 Freeport, NY	Consists of 10 cassette tapes and activity books that teach students how to prepare for listening, how to grasp main ideas, and how to write summaries/outlines. Grades 7–12.

From Gettinger M. and Knopik, S. N. (1987). "Children and Study Skills." In A. Thomas and J. Grimes (eds.), *Children's Needs: Psychological Perspectives* (pp. 594–602). Washington, D.C.: National Association of School Psychologists. Copyright © 1987 by the National Association of School Psychologists. Reprinted by permission of the publisher.

Table 1. *(Continued)*

Material	Publisher	Description
Primary Thinking Box	Benefic 10300 Roosevelt Westchester, IL	Multimedia kit covers five content areas and emphasizes thinking skills. Activities include filmstrips and cassettes as well as teacher-oriented methods. Grades K–3.
Setting the Pace	Charles Merrill 1300 Alum Creek Dr. Columbus, OH	Consists of 10 cassette tapes and a student workbook that provide exercises to improve reading speed, comprehension, and study skills. Grades 9–12.
Study Skills Series	Media Materials Box 368 Baltimore, MD	Consists of five filmstrips and activity workbooks; following directions, outlining, reading tables, graphs, and taking tests. Grades 4–7.
Test-Taking Techniques	Educational Activities P.O. Box 392 Freeport, NY	Consists of four cassette tapes and 10 activity books that teach ways to approach test situations and help establish positive attitudes toward taking tests. Grades 6–12.

tion that follows. Faw and Waller (30) describe the advance organizer as a conceptual bridge between the new material and students' current knowledge. Thus, introducing the concept of study skills through a detached program prior to skills training within content areas may be helpful to students. Derry and Murphy (27) propose such an approach with the first two weeks of each year devoted to training in learning skills. Different teachers are responsible for different aspects of the program, but all coordinate the same basic principles into their subject areas under a broad planning model, or metastrategy.

Embedded training programs instruct students in learning strategies and study skills within the context of the regular curriculum. This provides opportunities for immediate and frequent practice with relevant material. All teachers are responsible for teaching and suggesting strategies within their content area and for providing study questions or activities that require particular thinking processes (21).

Gagné and Driscoll (37) make five recommendations for teaching learning strategies:

1. Match strategies to the processing requirements of the learning task.
2. Provide learner strategies instruction consistent with the students' current knowledge and skill level.
3. Arrange for extensive practice in strategy use.
4. Prompt students, as necessary, to use strategies.
5. Promote metacognitive awareness in the early stages of instruction. (pp. 146–47)

Teaching Specific Strategies in the Content Areas

A learning strategy is simply a procedure that can be applied to help learn new material or gain comprehension of a particular subject. Students should be exposed to many different strategies so they can eventually become competent enough to unconsciously apply them in appropriate situations. Strategies for acquiring information include paraphrasing and self-questioning techniques, visual use of imagery and word identification procedures, methods to help inter-

pret visuals, and methods to improve reading comprehension such as the multipass or SQ3R method (73). Strategies for storing information include training students in the use of mnemonics and listening and note-taking.

Preparation for Class

Strategies can also be used to help students who are unprepared for class. Students can be taught to use the acronym PREPARE to get ready for class: *P*lan locker visits; *R*eflect on what you need; *E*rase personal needs; *P*sych yourself up for class; *A*sk yourself what is going on in class today; *R*eview your notes and study guides; *E*xplore the meaning of the class introduction.

Memorization

A strategy that can be used for memorization is first-letter mnemonics. To remember the names of the Great Lakes, students might remember the word HOMES (Huron, Ontario, Michigan, Erie, and Superior). To memorize the Great Lakes in their correct geographical order, students can use the saying, "She made Henry eat onions," (Superior, Michigan, Huron, Erie, Ontario).

Visual imagery is an excellent strategy to aid in retention of material. Students conjure up pictures or images in their minds to help them accomplish this. For example, to remember the states and their capitals (a paired associate task), students can imagine a picture that combines the capital and the state name. To remember Little Rock, Arkansas, they could visualize an *Arc* using a *Can* as a resting place on which to *Saw* a *Little Rock*. To remember that Augusta is the capital of Maine, they could picture *A* horse with a powerful *Gust-of* wind blowing the horse's *Mane*. Allowing students to actually draw the pictures may enhance the strategy's effectiveness.

The loci (Latin for place, location) method is helpful in remembering long lists of persons, places, or things. If the assignment was to memorize the first 16 presidents in order, students could begin by visualizing a very familiar room. Starting with the first piece of furniture to the left, they place Washington there (e.g., sitting on a chair), then they move to the next adjoining location for Adams (e.g., standing near the floor lamp) and place the third and following

presidents accordingly. Familiarity with the order of the room is important to place names or objects in correct order. In addition to visualizing rooms in the home, students can use the houses on their street or a familiar classroom.

Chunking small bits of information together (such as digits) often helps in memorizing long lists of items. For example, memorization of the original 13 colonies can be accomplished by committing to memory three groups of four with Georgia standing alone at the end.

Problem Solving

There are also many strategies that facilitate problem solving in the classroom. Students can use the acronym IDEAL as a reminder of the basic steps in problem solving: *I*dentify the problem, *D*efine the problem, *E*xplore a possible solution, *A*ct on possible solutions, and *L*ook for the effects of the experiment. Teaching critical thinking skills is an important complement to the teaching of study skills. Only in conjunction with critical thinking can study skills training lead to discovery and deepening of conceptual understanding. The teaching of problem-solving skills is too large an issue to be addressed adequately here. However, when students process conceptual information at deeper levels by making meaningful associations between old and new learning, they are able to deepen their understanding. This allows for critical reflection. Thus, information is not only remembered, but actively thought about. As with all skills that lead to students becoming lifelong independent learners, the development of critical thinking skills requires guided practice and overlearning if transference to other settings is to occur.

Note Taking

Even in the elementary grades teachers often find it desirable for students to write down assignments or key words. The importance of note taking increases as students reach the upper grades, until it becomes an imperative at the college level. It is obvious, however, that simply taking notes does not ensure effective study or comprehension. Effective note taking is related to the amount of processing the learner does when taking notes. Students who merely copy the text or write verbatim the words of the teacher process the

information only superficially. They are unlikely to make meaningful connections with previous knowledge or to monitor their understanding of what they are writing. However, students may paraphrase, elaborate, note connections, indicate possible areas of confusion, and organize information as they take notes. Each of these skills represents a higher level of processing and a more "strategic" form of note taking (5).

Teachers who present information in an organized format allow students time to think through the information and reorganize it in their notes. This kind of note taking is well suited to free recall tests. When tests demand that students draw relationships and reproduce content material without retrieval cues, teachers should encourage students to take notes this way (71). Similarly, students are better able to integrate information when they take notes from written text by summarizing or paraphrasing. To outline or summarize information accurately, they must recognize relationships. As many students have found to their dismay, simply putting the information into outline form does not guarantee learning. When instructing students in note taking, many teachers have traditionally spent a great amount of time teaching the particulars of superordinate and subordinate Roman numerals and alphabet letters. Time would be better spent, however, helping students evaluate the accuracy of their notes and judging the effectiveness of various strategies for different types of tests. Self-questioning techniques, for example, are often helpful (4).

Reading Comprehension

Comprehension in reading is fostered by readers' awareness of the purpose of reading and their ability to monitor their understanding of the material read. Mastering a particular set of behaviors to facilitate reading comprehension has been a traditional approach. Thus, students have been taught to *survey* reading material, ask appropriate *questions* about the material to be read, *read* the material, *recite* the material by paraphrasing, and *review* the material not remembered or understood. This method, termed the SQ3R technique, was first introduced by Robinson (73). Many similar techniques, such as the PQ4R (preview, question, read, reflect, recite, review) technique, were developed later (73). These methods force students to process reading at deeper levels and have proven effective (1, 28, 43, 59).

Test-Taking Skills

Teaching test-taking skills involves training students to recognize the techniques best suited for a particular kind of test. Millman, Bishop, and Ebel (60) define *test wiseness* as the ability to use test characteristics and formats and the testing situation to receive a high score. Programmed materials can be used to teach these skills (how to use time, avoid common errors, improve deductive reasoning, and recognize cues in questions). Some examples of such packages are The Test-Making Activity (57) for secondary students and The SCORER (22), which teaches strategies for both essay and objective tests.

Teachers can also help students to study for tests by helping them match knowledge with specific test formats within the content areas. A helpful framework has been devised by Towle (74). He lists the specific requirements for different test formats. For example, short-answer tests require students to use key words from the question in the answer; use strategies to retrieve relevant information; organize answers into facts, concepts, and generalizations; follow directions; and write phrases, sentences, or lists. A multiple-choice format, on the other hand, requires students to use cue words in questions, use association, and use visual imagery to recall specific pieces of information.

In addition, students can use affective strategies to reduce test anxiety. These techniques include goal-setting, time-management training, learning to place the test in accurate perspective, and practicing relaxation exercises before the test.

Efficacy of Study Skills Training

Study skills training programs that are brief, general in nature, and taught apart from specific content have not been found to be effective. Teaching study skills within the context of specific content, however, is not only advantageous, but enhances students' learning of content as well (19).

Teachers should teach students to be proficient not only in specific subject matter, but also in metacognitive processes in general. Moely et al. (61) found that teachers seldom made suggestions regarding metamemory (knowledge of memory processes, strategies, and other

factors that affect memory) and rarely provided explicit instructions about the memory strategies they did suggest. This is an important finding because results from laboratory memory studies indicate that students' require this type of intensive training in order to produce lasting, transferable strategy use (9, 51, 67). Many training studies report success in improving children's memory task performance. These studies have included young children (51), students with learning disabilities (42), and mentally retarded populations (19). The results of these and related studies suggest that classroom teachers could do much to aid students in developing effective memory and study skills.

MOVING STUDENTS TOWARD INDEPENDENT LEARNING

Developmental Changes in Metacognitive Awareness

In order to successfully teach study skills, teachers must have an awareness of how memory and metacognitive awareness develop in childhood. While the adolescent obviously has a greater ability to remember information than the kindergarten child, actual memory capacity has not grown. After infancy and early childhood, no great increases in memory capacity occur. However, the ability to use memory more efficiently does increase. Similarly, awareness of and ability to monitor learning also increases.

Kindergartners do not realize the limits of short-term memory. If presented with a series of digits, young children will often say that they can remember none of them or perhaps an unlimited number. Third graders can correctly estimate that they will be able to remember about seven digits—they intuitively know the limits of short-term memory. Similarly, children begin to realize that unrelated lists of words are more difficult to remember than related words. By middle school, many students are aware of the negative effects of interference on memory.

Teachers frequently make suggestions about strategies to students even at the kindergarten and first grade levels. At these levels children are capable of adopting and using simple strategies in specific situations. When children choose to use a certain strategy in a specific situation, they demonstrate an aspect of metacognition. Over time they change in both their strategy use and knowledge about memory and learning. As children grow older, they become more organized and deliberate in their approach to study tasks.

Given a free recall task (e.g., remembering a group of items in no particular order), preschool and kindergarten children will spend "study time" gazing at the objects and perhaps naming them orally. These are generally poor strategies and children of this age typically perform poorly on such tasks. In first or second grade (ages 6 to 8), however, use of rehearsal strategies appear. Rehearsal strategies

include saying the item names over and over again or perhaps writing the names down without simultaneously looking at the object. This is a fairly effective strategy for remembering information in a fixed order for a short time period (we often employ it to remember a short list of groceries or a phone number). Initially, children may use rehearsal less effectively than they could because they repeat material for a fixed number of times only. Thus, they have finished studying when they have said each word three times or written each word twice. Later in elementary school, they begin to use more complex strategies and to gain an important tool in monitoring their own learning—self-testing.

A more mature strategy involves chunking and rearranging of material in organized and meaningful ways. A sophisticated strategy such as grouping objects together on the basis of meaning is not likely to occur spontaneously until fourth or fifth grade (34, 61). However, if they are guided through the task, younger children can make use of such strategies. The same is true of elaboration strategies (visual imagery, drawing associations, etc.). While these may emerge spontaneously in fourth or fifth grade, younger children may benefit from them if they are helped to develop and use them.

An important aspect of learning, the ability to self-test, also emerges around the early middle school grades. The child of six or younger will tend to study for only a brief period of time and then quit in a free recall situation. The second or third grader may approach the task more strategically, but will study for a predetermined amount of time. As mentioned previously, children of this age will often have a "magical" fixed number of repetitions. Once they have said the names of each item three times, for example, they consider study time over. By fourth grade, students may begin to test themselves for memory and understanding. They give themselves practice tests that allow them to ascertain their knowledge and understanding and determine what and how much more to study. When students employ self-testing techniques, their recall is good and is reflected in their performance on their "trial tests." Thus, as children grow, what they do regarding study tasks and what they know about learning and memory changes.

By middle school, students can be taught to develop their study skills by increasing their knowledge about memory, their awareness of their own cognitive processes, and their use of effective strategies. These students should be spontaneously using such strategies as

rehearsal and chunking. Self-testing should also emerge in the middle school years, especially among the most successful students (32, 35). Students who do not display these kinds of strategies for remembering and monitoring their learning are among the least successful. At the secondary level it becomes imperative to teach the full array of skills to those who have not spontaneously developed them. Guided practice of these skills at the elementary level may facilitate their use and development independently by students in the upper grades. Interestingly, some studies have found that students with learning disabilities fail to spontaneously develop basic strategies and show an inability to transfer and choose appropriate strategies even after instruction (42). This illustrates the importance of strategic learning to academic success.

Teacher Influences on Independent Learning

Teacher perceptions of their students' study skills are influential in determining how teachers structure learning activities as well as the demands they place on their students' memories. A large body of research has reported that teacher expectations can and do affect classroom behavior (12, 13, 16, 17, 23, 29, 31, 54). Recent work by Moely et al. (61) found that teachers make suggestions to their students about how to remember and learn material. According to these authors, teachers did not make suggestions with high frequency, however, and suggestions tended to peak at the upper elementary grades, just when students are cognitively ready to absorb the most from study skills training. Moreover, teachers tend to concentrate on specific strategy instruction and to assume that students understand how the strategies work and how to monitor their comprehension and learning.

To move students toward independent learning, teachers must ensure that strategy use becomes generalized and automatic. Teachers can use four procedures to increase generalization and maintenance of trained study strategies. First, training must be intensive so that the strategy is overlearned. Second, students need to know why the strategy is effective (how it facilitates learning and memory), especially for a specific task. Third, teachers should stress the

potential generalizability of the strategy by providing examples of its use in other cases and cueing students to use it when appropriate. Fourth, teachers must train in "self-control" strategies. These strategies involve explaining to students how to monitor and regulate their own learning (46, 47, 51, 52, 63). At each developmental level, teachers can aid their students' strategy use by incorporating these four procedures into their daily lessons within the regular curriculum.

INCORPORATING STUDY SKILLS INTO LEARNING OUTCOMES

Gagné and Driscoll describe five kinds of learning outcomes or objectives: verbal information, intellectual skills, attitudes, motor skills, and cognitive strategy outcomes (37). While transfer of verbal information and the teaching of intellectual skills are major concerns for teachers, many forget to specifically consider important learning outcomes such as attitudes and cognitive strategy training. To help students become independent learners, effective teachers instruct them in learning and study strategies on a daily basis. Objectives for teaching and evaluating learning strategies become part of each teacher's day-to-day lesson plan.

Gagné and Driscoll define cognitive strategies as the ways by which learners guide their attending, learning, remembering, and thinking (37). These activities allow for executive control of learning or metacognition. Cognitive monitoring refers to regulating how this knowledge is gained as well as the cognitive strategies used in achieving learning goals (33). There is a difference between cognition and metacognition as well as between cognitive and metacognitive strategies. Cognition refers to one's awareness and understanding of a certain subject, (e.g., knowledge of the American form of representative government). Metacognition refers to one's awareness of the depth and quality of knowledge about the American form of government. Metacognition also includes awareness of capabilities for learning more. Metacognitive strategies are used to determine which cognitive strategies to employ to gain further information (50). For example, determining that you need to review material more carefully involves a metacognitive decision to use a specific strategy. The teaching of both cognitive and metacognitive strategies is important in the classroom; both strategies are facilitated by attending to the critical conditions for learning them that Gagné and Driscoll describe.

Critical learning conditions are external influences that can be brought to bear upon learning to facilitate it. To facilitate the learning of cognitive and metacognitive strategies, certain conditions should be present:

1. The strategy must be described and, whenever possible, demonstrated.

2. Opportunities for strategy practice must be provided.

3. Informative feedback on strategy use must be provided. (37)

Teachers should include objectives that address the teaching of study skills in their lesson plans. These learning outcomes must include appropriate evaluation of strategy acquisition in order to ensure learner progress. Students demonstrate this acquisition by using the strategy in a specific situation, showing well-planned approaches to learning problems, making accurate judgments concerning their learning, and devising their own strategies and study routines.

CONCLUSION

In an information age, simple transference of knowledge becomes complicated. Increasingly, students must learn how to learn. Successful students are marked by their ability to act strategically in learning settings. These students choose and apply cognitive strategies to help themselves understand, process, and retain information. They understand which strategies work best in specific situations and which ones work best for them as individuals. The most successful students are able to monitor their learning and can accurately estimate their comprehension and memory. These students are independent learners, not completely dependent on teachers; they have the capability of becoming lifelong learners.

The integration of study skills into the context of the regular classroom and across the curriculum is essential. Strategic learning is the greatest tool of educators for making every student successful, regardless of ability level. An effective study routine and increased metacognitive awareness are the greatest gifts teachers can give students because they empower them, allowing them to manage their learning and to succeed.

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